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Fast and Optimal Path Planning Algorithm (FAOPPA) for a Mobile Robot

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Article

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Abstract

Motion planning problem though widely studied in robotics is a difficult problem. It finds a feasible path from an initial position to a final position in an environment with obstacles. Recent researches do not just aim to find feasible paths but to find paths that are optimal in respect to time, distance and safety of the robots. Optimization based techniques have been proposed to solve this problem but some of them used techniques that may converge to local minimum and they seldom consider the speed of the technique. Hence this paper presents a fast and global motion planning algorithm for a mobile robot in a known environment with static obstacles. It uses particle swarm optimization (PSO) technique for convergence to global minimum and a customized algorithm which generates the coordinates of the search space. The coordinate values when generated by the customized algorithm are passed to the PSO algorithm which uses them to determine the shortest path between the two given end positions. We perform our experiments using four different environments with population sizes 100, 50, 20 and 10 in a 10 × 10 grid and our results are favorable.

Keywords

Motion planning Optimization Particle swarm optimization Algorithm Robotics

Notes

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Author Contributions

All the authors contributed immensely to this research. The paper is a product of optimization sub cluster of the Department of Mathematics, Covenant University, Ota.

Compliance with ethical standards

Conflicts of interest

The authors declare no conflict of interest.

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